#### Paper 1557-2014

# The Query Builder: The Swiss Army Knife of SAS® Enterprise Guide®

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## ABSTRACT

The SAS® Enterprise Guide® Query Builder is one of the most powerful components of the software. It enables a user to bring in data, join, drop and add columns, compute new columns, sort, filter data, leverage the advanced expression builder, change column attributes, and more! This presentation provides an overview of the major features of this powerful tool and how to leverage it every day.

### WHAT IS THE QUERY BUILDER?

Enterprise Guide is a user interface for SAS. EG passes SAS code to a server to run the SAS code (whether you are writing code or using the tasks in EG). The server could be your local machine, a server on your network, it could even be on another platform. A task is a point and click user interface in Enterprise Guide that generates SAS code. Each task has an analogous PROC (although not 1 to 1 relationship).

One of the most powerful tasks is the Query Builder. The Query Builder allows you to manipulate data tables in a variety of ways, including joining tables, selecting variables, filtering data, sorting data, changing data sources, computing columns, setting up prompts, de-duping observations, adding titles and footnotes, limiting output, changing query options, and more.

#### What's SQL

A query language used by many software packages.

The Query Builder in Enterprise Guide generates PROC SQL code behind the scenes.

We don't code SQL because the query builder will do it for us.

#### SQL

Example of SQL code in SAS:

```
proc sql options;
create table|view as /* output table to create */
select column(s) /* Select/create columns */
from table-name | view-name /* Name input sources */
where expression /* Sub-set rows from table*/
group by column(s) /* Group rows for summary */
having expression /* Subset GROUP BY results*/
order by column(s) /* Sort resulting rows */
;
guit;
```

#### Why Should I Care About the Query Builder?

Quickly bring together data

Manipulate/modify data easily

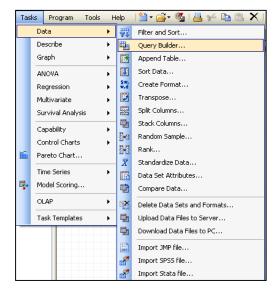
Error free queries

Quicker, less error prone that coding.

#### **Creating a New Query**

In the Process Flow or Project Window, highlight a data set.

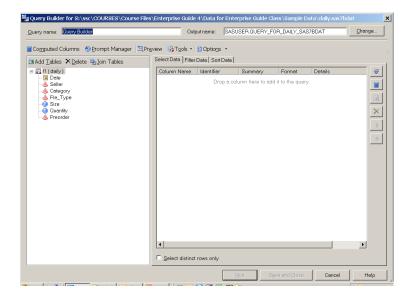
On the Data, Tasks menu, select Query Builder.



#### **The Query Builder**

The Tables list shows the columns that make up query tables.

The Select Data tab lists the columns included in the query.



### Adding Columns to a Query

Double-click columns to add them to the query.



x

🗄 Add Tables 🗙 Delete 🖷 Join Tables	Select Data Filter	Data   Sort Data				
🗉 📆 t1 (daily)	Column Name	Identifier	Summary	Format	Details	4
Date Date	Date	t1.Date				
- 🝐 Seller	▲Seller	t1.Seller				1
- 🝐 Category	💧 Category	t1.Category				_
- 🔌 Pie_Type	A Pie_Type	t1.Pie_Type				
	3 Size	t1.Size				
- 🥺 Quantity	😡 Quantity	t1.Quantity				
- 📣 Preorder	A Preorder	t1.Preorder				
						_
	•					•
						-

## Saving, Running and Canceling

Saving stores the query so it can be modified or run later.

Running carries out the query and also saves it.

Canceling closes the query without saving it.

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Computed Columns  🗐 Prompt Manager 🛛						
🗄 Add Tables 🗡 Delete 🖷 Join Tables	Select Data   Filter	Data   Sort Data				
🗄 🌄 11 (daily)	Column Name	Identifier	Summary	Format	Details	*
Date	📃 Date	t1.Date				
- 🔌 Seller	▲Seller	t1.Seller				
- 🔌 Category	Category	t1.Category				
\land Pie_Type	A Pie_Type	t1.Pie_Type				
🞯 Size	🔞 Size	t1.Size				
- 😡 Quantity	😡 Quantity	t1.Quantity				×
- 📣 Preorder	Atype_of_pie	t1.Preorder	-			
						1
						4
	•					•
	Select distinct	rows only				

**Query Results Format** 

There are three formats for query results:

Data table

Data view

Report (HTML)

#### **Data Tables**

A Data Table:

Is a static table of values.

Is not updated unless the query is rerun.

Can have tasks run against it.

	📕 🛛 Date	🔌 Seller	🔌 Category	🔌 Pie_Type	🥥 Size	😟 Quantity	🔌 Preorder
1	06/25/2006	Betty	Chocolate Pies	Death By Chocola	8	1	No
2	06/25/2006	Betty	Fruit Pies	Lemon Meringue	10	5	Yes
3	06/25/2006	Lenore	Fruit Pies	Strawberry	10	2	No
4	06/25/2006	Frank	Fruit Pies	Apple	10	1	No
5	06/25/2006	Betty	Fruit Pies	Blueberry	10	3	Yes
6	06/25/2006	Marge	Chocolate Pies	French Silk	8	2	No
7	06/25/2006	Marge	Chocolate Pies	Peanut Butter Cup	10	1	No
8	06/25/2006	Frank	Chocolate Pies	Black Forest	8	5	Yes
9	06/25/2006	Lenore	Fruit Pies	Banana Cream	8	2	Yes
10	06/25/2006	Betty	Chocolate Pies	Peanut Butter Cup	8	2	No
11	06/25/2006	Frank	Fruit Pies	Raspberry	10	2	No
12	06/25/2006	Marge	Fruit Pies	Apple	8	4	Yes

#### **Data Views**

A Data View:

Is a dynamic table.

Stores logic to carry out on data rather than the data itself.

Is updated as the source data changes.

Can have tasks run against it.

#### Reports

A Report:

Is a static HTML document.

Is not updated unless the query is rerun.

Can not have have tasks run against it.

Date	Seller	Category	Pie_Type	Size	Quantity	Preorder
06/25/2006	Betty	Chocolate Pies	Death By Chocolate	8	1	No
06/25/2006	Betty	Fruit Pies	Lemon Meringue	10	5	Yes
06/25/2006	Lenore	Fruit Pies	Strawberry	10	2	No
06/25/2006	Frank	Fruit Pies	Apple	10	1	No
06/25/2006	Betty	Fruit Pies	Blueberry	10	3	Yes
06/25/2006	Marge	Chocolate Pies	French Silk	8	2	No
06/25/2006	Marge	Chocolate Pies	Peanut Butter Cup	10	1	No
06/25/2006	Frank	Chocolate Pies	Black Forest	8	5	Yes
06/25/2006	Lenore	Fruit Pies	Banana Cream	8	2	Yes
06/25/2006	Betty	Chocolate Pies	Peanut Butter Cup	8	2	No
06/25/2006	Frank	Fruit Pies	Raspberry	10	2	No
06/25/2006	Marge	Fruit Pies	Apple	8	4	Yes

# Selecting Query Results Format

On the Tools menu, select Options, Query.

Save query result set as, Select Data Table, Data View or Report.

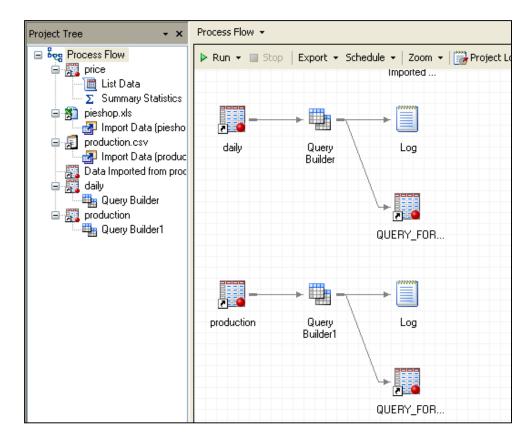
Options		×
General Project Views Project Recovery Results Results General Viewer SAS Report HTML RTF PDF Graph Stored Process Data Data General Performance Query Tasks Tasks Tasks General Custom Code Output Library SAS Programs	Query         Image: Automatically walidate query whenever changes are made         Image: Automatically attempt to join tables in query         Automatically add columns from input tables to result set of query         Image: Automatically add columns from input tables to result set of query         Image: Automatically add columns from input tables to result set of query         Image: Automatically add columns from input tables to result set of query         Image: Automatically convert alias and label definitions to a standard SAS identifier         Number of rows to process in preview results window:         Input:       Image: Imag	~
	Data table Data view Report Heset Query Builder window settings Data table - saves query results as a static data table. Data view - saves query results as a dynamic data view. Report - saves the query results as a report in the format that you have specified as your default. More (F1) OK Apply Cancel	

# Query Results

After the query runs:

Objects for the query and its results appear in the Process Flow and Project Tree.

The original data set has not changed.



## Working with Query Results

You can set the output location of your query, under the options.

📓 Query Option	าร	×
Results Server	Results	
Pass-through Prompts Titles Other	Result format	
	Data <u>t</u> able     O Data <u>v</u> iew     O Report	
	Output data	
	Name: SASUSER.QUERY_FOR_DAILY_SAS7BDAT	
	<u>Change</u> <u>R</u> eset	
	Label: QUERY_FOR_DAILY_SAS7BDAT	
	Ogtions:	
	Query limits	_
	Limit number of matching rows to process:	
	Limit number of rows to save in output:	
	The library and filename of the results.	<b>A</b>
	More (F1)	-
	OK Cancel	
		.::

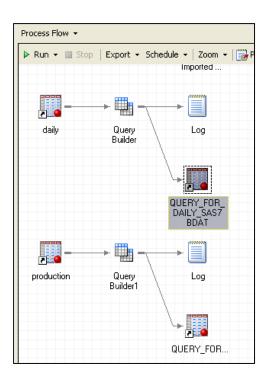
# Working with Query Results

Tasks may be run on query results if you have specified data table or data view as your output option.

To run a task on query results:

In the Process Flow or Project Tree, highlight the query results.

From the Task List, select a task and proceed as usual.



# Sorting

Sorting changes the order of the observations in a table by ranking the observations based on the values of one or more variables.

Query Builder for S:\ssc\COURSES\Co Query name: Query Builder	urse Files\Enterprise	Guide 4\Data fe Output name:		Guide Class\Sam		dat Change
Computed Columns Prompt Manage Mad Tables Columns	er 🗖 Pr <u>e</u> view 🍇 Toj Select Data Filter Dat		; <b>-</b>			
	Column Name			Identifier	Sort Direction	
─⊞ Date → Seller → Category	& Category			t1.Category	Ascending Ascending Descending	×
- ▲ Pie_Type - ④ Size - ③ Quantity - ▲ Preorder						4
	•			· · · · · · · · · · · · · · · · · · ·		
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Start   🛃   💽 SA 🔯 S:\s 🔀 I	Inb 🛛 🚾 Micr 🗍 🏈	😡 🕑 🖸 🛛	र 🔄			« 12:10

Results

Click Run to run the query.

Category	Pie Type	Size	Quantity	Seller
Chocolate Pies	Death By Chocolate	8	1	Betty
Chocolate Pies	Peanut Butter Cup	8	2	Betty
Chocolate Pies	Peanut Butter Cup	10	1	Marge
Chocolate Pies	French Silk	8	2	Marge
Chocolate Pies	Black Forest	8	5	Frank
Fruit Pies	Strawberry	10	2	Lenore
Fruit Pies	Apple	8	4	Marge
Fruit Pies	Blueberry	10	3	Betty
Fruit Pies	Raspberry	10	2	Frank
Fruit Pies	Lemon Meringue	10	5	Betty
Fruit Pies	Apple	10	1	Frank
Fruit Pies	Banana Cream	8	2	Lenore

# Sorting by Multiple Variables

Add additional variables to the Sort Data tab.

Use the

and 🕂

buttons to arrange the variables in order of sort priority.

uery Builder for S:\ssc\COURSES\	Course Files\Enterpris	e Guide 4\Data for Ei	nterprise Guide Cl 🔀
Query name: Query Builder	Output name: S	ASUSER.QUERY_FOR_D	AILY_SAS Change
🔢 Computed Columns 🛛 🅙 Prompt Manager	Preview 🛛 🕰 Tools 🔹	· —	
🔡 Add Tables 🗙 Delete 🏨 Join Tables	Select Data Filter Data	Sort Data	
🖃 🧱 t1 ( daily )	Sort Name	Input	Sort Direction
⊞ Date ∕A Seller	🔌 Category	t1.Category	Ascending
Category	😡 Size	t1.Size	Ascending X
Pie_Type	A Pie_Type	t1.Pie_Type	Ascending 💌 🔂
Size			
Quantity			
	<		>
		Course and Classes	Canada Labo
	<u>R</u> un	Save and Close	Cancel Help

## Results

Use the Select Data tab to change the order of the variables.

Click Run to run the query.

Category	Size	Pie_Type	Quantity	Seller
Chocolate Pies	8	Black Forest	5	Frank
Chocolate Pies	8	Death By Chocolate	1	Betty
Chocolate Pies	8	French Silk	2	Marge
Chocolate Pies	8	Peanut Butter Cup	2	Betty
Chocolate Pies	10	Peanut Butter Cup	1	Marge
Fruit Pies	8	Apple	4	Marge
Fruit Pies	8	Banana Cream	2	Lenore
Fruit Pies	10	Apple	1	Frank
Fruit Pies	10	Blueberry	3	Betty
Fruit Pies	10	Lemon Meringue	5	Betty
Fruit Pies	10	Raspberry	2	Frank
Fruit Pies	10	Strawberry	2	Lenore

# **Filtering Data**

Filtering is carried out in the Query Builder.

Note that there is also a task for just filtering and sorting.



### What is a Filter?

A filter:

Specify a condition that determines which rows will be included in the query results.

Does not affect which columns are in the results.

Examples:

Inventory is less than 200

Age is greater than 65

Importance equals 'urgent'.

## Creating a New Filter in a Query

Click the Filter Data tab.

Double-click a variable to open the Edit Filter window.

This variable will be the left side of the filter condition.

uery Builder 2 for S:\ssc\COURSES	\Course Files\Enterprise Guide 4\Data for Enterprise	Guide 🔀
Query name: Query Builder2	Output name: SASUSER.QUERY_FOR_PRICE_SAS	<u>C</u> hange
🔠 Computed Columns   🚳 Prompt Manager	🔀 Preview 🛛 🙀 Tools 👻 🔀 Options 👻	
🖽 Add Tables 🗙 Delete 🏨 Join Tables	Select Data Filter Data Sort Data	
E I (price)	Filter the raw data Opera	
Type Size		
		0
	Run Save and Close Cancel	Help

Operators

An operator states the relationship between the two sides of the filter condition.

Examples of operators are greater than, less than, and equal to.

### **Selecting an Operator**

New Filter	×
<b>1</b> of 2 Build a basic filter	<u>s</u> sas
Identifier: [tl.Price	
Column Name:	
Operator: Equal to Equal to	<b></b>
☑ <u>G</u> enerate filt <mark>Not equal to</mark>	
Less than	
Value: Creater than	
t1.Price = . Greater than or equal to	
$\Box$ Enclose values in quotes	
< <u>Back</u> V Next> Einish	Cancel Help

Select an operator from the Operator drop-down menu.

### The Right Side of the Filter Condition

The right side of the filter condition may be:

A value

A value selected from a list

A group of values

A variable

A prompt

### **Right Side: User-Entered Value**

Type a value in the Value field.

Click Next.

of 2 Build a basic filter		<u>sas</u>
Identifier: t1.Price		
Column Name:		
Operator: Greater than		<b>•</b>
Generate filter for a prompt value (only	y applies to prompt types)	
⊻alue: 🦻		•
11.Price > 9		
Enclose values in quotes		
Enclose values in quotes	< <u>Back</u> y <u>N</u> ext	Einish Cancel Help
	<u>Back</u> y <u>N</u> ext	
Filter 2 of 2 Summary of properties	(Back r Next)	Enish Cancel Help X SSAS

Verify Summary of properties and click Finish.

# Right Side: Value from a List

In the New Filter window, click the



button next to the Value field.

On the Values tab, click Get Values.

Select a value on the list.

Verify Summary of properties and click Finish.

	New Filter	x
Values Columns Prompts	1 of 2 Build a basic filter	<u>S</u> sas
Value       Formatted Value         Apple       Apple         Banana Cream       Banana Cream         Black Forest       Black Forest         Blueberry       Blueberry         Chocolate Mousse       Chocolate Mousse         Death By Chocolate       Death By Chocol         French Silk       French Silk         Lemon Meringue       More Values	Identifier:     1.Type       Column Name	A Cancel Hep
Values Columns Prompts		
Get <u>Values</u> Cancel		

### Advanced Filters

Advanced filters can contain expressions or functions on either side of the operator.

Advanced filters are created using the Advanced Expression Builder.

Build by typing in the expression box, double-clicking variables, values, or functions, or single-clicking operators.

Edit Filter	×
<b>1</b> of 2 Build an advanced filter	<u>s</u> .sas.
Enter a filter:	
t1.Price >= 2 * t1.Cost	
Home Next Back End Undo Redo Edit • Eavorites • Validate	
+ - * / **    (x) 'x' 'x" , 'abc'n	
AND OR NOT = <> < <= > >= Advanced Operator +	
Image: Productions         Image: Tables         Image: Product of the second s	
< <u>Back</u> ▼ <u>N</u> ext> <u>F</u> inish Can	cel Help

## **Functions In A Filter**

Over 500 SAS functions are available in a filter.

Scroll down to SUBSTR, click. The first argument can be typed over, or double clicked and a column chosen.

New Filter	X
<b>2</b> of 3 Build an advanced filter	<u>s</u> sas.
Enter a filter:	
SUBSTR(< <charvalue>, <numvalue>)</numvalue></charvalue>	
Home Next Back End Undo Redo Edit - Favorites - Validate	
+ - * / **    (x) 'x' "x" , 'abc'n	
AND OR NOT = <> < <= > >= Advanced Operator •	
$f_{\Theta} \text{ STFIPS Function} = \\ f_{\Theta} \text{ STN}_{\text{Boolean NOT operator}} \text{BSTR Function} \\ f_{\Theta} \text{ STNAMEL Function} = \\ f_{\Theta} \text{ STRIP Function} = \\ \text{Extracts a substring from an argument} \\ \end{cases}$	*
<i>f</i> ⊕ SUBPAD Function <i>f</i> ⊕ SUBSTR Function	-
<back next="" ▼=""> Finish Cancel</back>	Help

Multiple Filters: AND/OR

Ways filters can relate to each other:

AND: An observation will pass through only if both conditions are true.

OR: An observation will pass through if either condition is true or if both are true.

AND Filters

By default, if two or more filters are added to a query, the filters are related by AND.

uery Builder 2 for S:\ssc\COURSES	\Course Files\Enterprise Guide 4\Data for Ente	erprise Guide 🚺
Query name: Query Builder2	Output name: SASUSER.QUERY_FOR_PRICE	_SAS <u>C</u> hange
📆 Computed Columns 🛛 🍪 Prompt Manager	🔀 Preview 🛛 🌇 Tools 👻 🔀 Options 👻	
🖽 Add Tables 🗙 Delete 🖷 Join Tables	Select Data Filter Data Sort Data	
□ III (price) A Category	Filter the raw data	Operator 🍸
Туре		AND
·····(a) Size	<b>T</b> t1.Size = 8	
Cost		$\mathbf{X}$
		0
	<u>R</u> un S <u>a</u> ve and Close <b>Ca</b>	ncel Help
	Run Save and Close Ca	ncel He

Results

Click Run to run the query.

Category	Туре	Size	Price	Cost
Chocolate Pies	Chocolate Mousse	8	8.99	4.25
Chocolate Pies	French Silk	8	6.99	3.2
Chocolate Pies	Death By Chocolate	8	10.99	5.25
Chocolate Pies	Peanut Butter Cup	8	9.99	5
Chocolate Pies	Black Forest	8	7.99	3.95

Changing an AND Filter to an OR Filters



# On the Filter Data tab, click Combine Filters

to open the Filter Combination window.

Click AND between the two filters. Click Change to OR.

uery Builder2 for S:\ssc\COURSES	Course Files\Enter	prise Guide 4\Data for Er	nterprise Guide 👔
Query name: Query Builder2	Output name:	SASUSER.QUERY_FOR_PRI	CE_SAS Change
Computed Columns S Prompt Manager	Review Select Data Filter Da		Operator 🛛
Category - A Type - Size - Price - Cost	Where	y = 'Chocolate Pies'	AND 🔹 🔀
	Eun	Save and Close	Cancel Help
Filter Combination			
😭 Group 🥋 Ungroup 🐄 Reset   🏆 New F	Filter 🎇 Edit Filter ≯	(Delete Filter   🖨 Move Left	
Category = 'Chocolate Pie Change entire group to OR			
WHERE t1.Category = 'Chocolate Pies' AND t1.	Size = 8		×
		OK Ca	ncel Help

You can also click on the down arrow next to the And to modify.

Results

Click Run to run the query.

Category	Туре	Size	Price	Cost
Chocolate Pies	Chocolate Mousse	8	8.99	4.25
Chocolate Pies	Chocolate Mousse	10	10.99	5.5
Chocolate Pies	French Silk	8	6.99	3.2
Chocolate Pies	French Silk	10	8.99	4.75
Chocolate Pies	Death By Chocolate	8	10.99	5.25
Chocolate Pies	Death By Chocolate	10	12.99	6.85
Chocolate Pies	Peanut Butter Cup	8	9.99	5
Chocolate Pies	Peanut Butter Cup	10	11.99	6
Chocolate Pies	Black Forest	8	7.99	3.95
Chocolate Pies	Black Forest	10	9.99	4.95
Fruit Pies	Raspberry	8	6.99	3.55
Fruit Pies	Rhubarb	8	5.99	3.15
Fruit Pies	Strawberry	8	4.99	2.6
Fruit Pies	Blueberry	8	5.99	3.2
Fruit Pies	Lemon Meringue	8	8.99	4.55
Fruit Pies	Banana Cream	8	7.99	4.2
Fruit Pies	Apple	8	6.99	3.7

Additional Filter Hints

**Grouping Filters** 

Note the difference between:

(Filter 1 AND Filter 2) OR Filter 3

and

Filter 1 AND (Filter 2 OR Filter 3)

In the Filter Combination window, hold down the CTRL key and click on filters to select filters for grouping.

Use the Group and Ungroup buttons to change the way the selected filters are grouped.

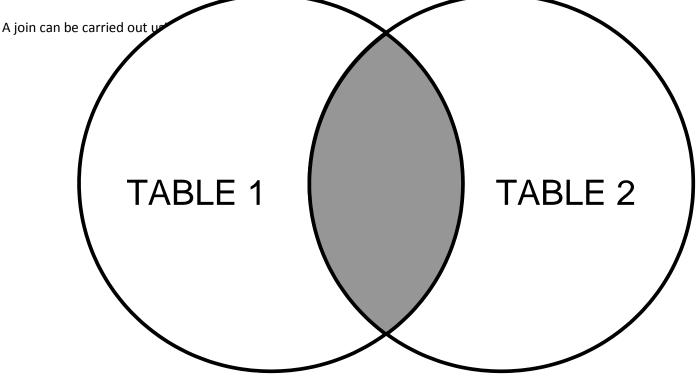
**Deleting Filters** 

On the Filter Data tab, highlight a filter.

Click the X button to delete the filter.

Joining Data Tables

Joining is the process of merging two data sets by fusing together certain observations based on the values of variables.



Automatic Joins

An automatic join occurs when two data sets in a query have a variable with the same name and type.

EG searches for a suitable join variable for an automatic join when the second data table is added to the query.

An automatic join is an equijoin by default.

Inner Joins

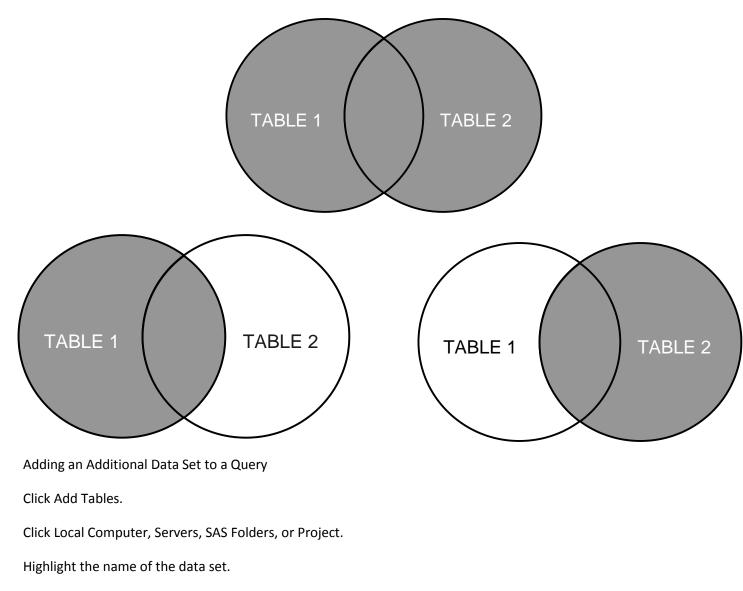
In an inner join, a row is included only if the join variable value is common to both tables.

Rows without a match are omitted.

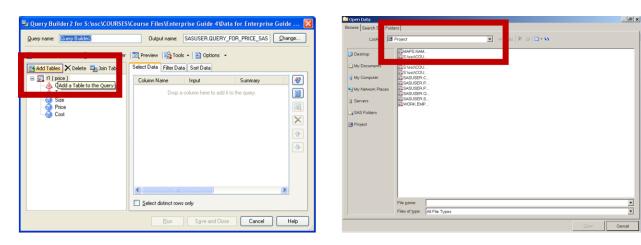
**Outer Joins** 

In a full outer join, all rows from both tables are included.

In a right outer join or a left outer join, all rows from one of the tables are included, along with the corresponding rows from the other table.



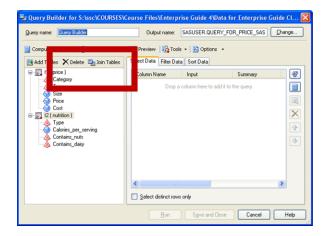
Click Open.

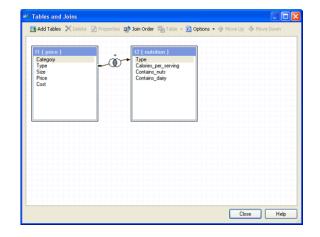


**Viewing Automatic Joins** 

Click the Join Tables button.

The diagram will indicate which columns will be used as join variables.





Selecting Columns

By default, none of the columns from the new table will be included in the query.

Double-click columns on the Tables list to add them to the query.

📲 Query Builder for S:\ssc\COURSES\C	ourse Files\Enterpr	ise Guide 4\Data fo	or Enterprise Guid	e CI 🔀
Query name: Query Builder	Output name:	SASUSER.QUERY_FO	R_PRICE_SAS	ange
🔢 Computed Columns   🚳 Prompt Manager	📆 Preview 🛛 🏠 Tools	🕶 🛛 😰 Options 🕞		
🖽 Add Tables 🗙 Delete 🏨 Join Tables	Select Data Filter Data	Sort Data		
E ti (price)	Column Name	Input	Summary	<b>*</b>
Category	💩 Category	t1.Category		
- Gillia Size	🔌 Туре	t1.Type		
Price	😡 Size	t1.Size		
🛄 😡 Cost	1 Price	t1.Price t1.Cost		
😑 🚟 t2 ( nutrition )	1 Cost	t2.Calories_per_ser		$\mathbf{X}$
	Contains_nuts	t2.Contains_nuts		
	A Contains_dairy	t2.Contains_dairy	-	
Contains_dairy				
				_
				_
	<		>	
	Select distinct rows	only		
	<u>R</u> un	S <u>a</u> ve and Close	Cancel	Help

Results

Click Run to run the query.

				Calories per		
Category	Туре	Size	Price	Serving	<b>Contains Nuts</b>	Contains Dairy
Chocolate $Co$	lumns from	8	8.99	550 C	olumns fro	om <sup>Yes</sup>
<sup>Chocolate</sup> Pri	ce data	10	10.99	<sup>550</sup> N	utrition da	ta <sup>Yes</sup>
Chocolate Pies	French Silk	8	6.99	475	No	Yes
Chocolate Pies	French Silk	10	8.99	475	No	Yes
Chocolate Pies	Death By Chocolate	8	10.99	800	No	Yes
Chocolate Pies	Death By Chocolate	10	12.99	800	No	Yes
Chocolate Pies	Peanut Butter Cup	8	9.99	750	Yes	Yes
Chocolate Pies	Peanut Butter Cup	10	11.99	750	Yes	Yes
Chocolate Pies	Black Forest	8	7.99	700	No	Yes
Chocolate Pies	Black Forest	10	9.99	700	No	Yes
Fruit Pies	Raspberry	8	6.99	400	No	No
Fruit Pies	Raspberry	10	8.99	400	No	No
Fruit Pies	Rhubarb	8	5.99	425	No	No
Fruit Pies	Rhubarb	10	7.99	425	No	No
Fruit Pies	Strawberry	8	4.99	485	No	No
Fruit Pies	Strawberry	10	6.99	485	No	No
Fruit Pies	Blueberry	8	5.99	375	No	No
Fruit Pies	Blueberry	10	7.99	375	No	No
Fruit Pies	Lemon Meringue	8	8.99	525	No	Yes
Fruit Pies	Lemon Meringue	10	10.99	525	No	Yes
Fruit Pies	Banana Cream	8	7.99	490	No	Yes
Fruit Pies	Banana Cream	10	9.99	490	No	Yes
Fruit Pies	Apple	8	6.99	350	No	No
Fruit Pies	Apple	10	8.99	350	No	No

### Manual Joins

A manual join:

Requires you to specify which variables will be used to join the tables.

Is necessary when joining by more than one variable, or variables with different names.

Performing a Manual Join

Add the second data set.

Click OK when a message tells you that you need to join the tables manually.

uery Builder for S:\ssc\COURSES\C	ourse Files\Enterp	rise Guide 4\Data	for Enterprise Guid	le Cl 🗙
Query name: Query Builder	Output name:	SASUSER.QUERY_F	FOR_PRICE_SAS	hange
🔠 Computed Columns 🛛 🎒 Prompt Manager	📆 Preview 🛛 🌇 Too	ıls 🕶 🛛 🔀 Options 🕞		
🛗 Add Tables 🗙 Delete 💾 Join Tables	Select Data Filter Da	ita Sort Data		
□-∰ t1 (production ) ▲ Maker	Column Name	Input	Summary	8
	Drop a	a column here to add it t	to the query.	
→ A Pie_Type				
Quantity				
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □				$\mathbf{X}$
уре				
Calories_per_serving				-
Contains_dairy				
Query Builder for S:\ssc\COURSES\Co	ourse Files\Enterp	rise Guide 4\Data 1	for Enterprise Guid	e Cl 🔀
A suitable join could not be determ	ined for the new table.	You will need to join the	e tables manually.	
	ОК			
				пор

Performing a Manual Join (continued)

Right-click the join variable from the first table.

Select Join <variable> with.

Select the name of the second table.

Select the name of the join variable from the second table.

A window will pop up for you to define what type of join.

Click OK to close the Join Properties screen.

Click CLOSE to close the Tables and Join screen.

Add Tables X Delete Engeneries @ Jan Order & Table - 20 Options + 2 Move Up + Move Down	Add Tables	bins							E
Maker       Type         Colores_per_serving       Colores_per_serving         Colores_full       Colores_full         Delete Table       Colores_full         Show Columns by Label       Contans_full         Properties       Contans_full         Join type       Maker         Maker       Maker         Maker       Contans_full         Properties       Contans_full         Join type       X         Maker       Maker         Maker       Maker         Maker       Contans_full         Maker       Maker         Maker       Makr         Marco		🗙 Delete 🗄 Prop	erties 🐏 Join Or	der 🖷 Table + 🖄 (	Options + 1≥ Move U	lp 🖖 Move Do	wn		
Core Help		ion )		ı)					
Size Outrow Delete Table Columns Contains_dary Contains_dary Contains_uter Contains_dary Contains_dary Contains_dary Contains_dary Properties	Category		Calories_per_						
Date       Sort Columns       Contains_dary         Show Columns by Label       Contains_dary         Properties       Properties         In Properties       X         Join type       X         Matching rows only given a condition (Inner Join)       All rows from the left table given a condition (Left Join)         All rows from the left table given a condition (Fulpf Join)       All rows from both tables given a condition (Fulpf Join)         All rows from both tables given a condition (Full Outer Join)       The cartesian product (Cross Join)         Condition       Fight table and column:	Size 🕨		/pe] with 🔸						
Contains_dary Co	Quantity Date								
Cose Help  In Properties Join type  Matching rows only given a condition (Inner Join) All rows from the left table given a condition (Left Join) All rows from the right table given a condition (Left Join) All rows from both tables given a condition (Full Outer Join) The cartesian product (Cross Join) Condition Left table and column: Right table and column:									
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<b>1 Properties</b> ioin type         Matching rows only given a condition (Inner Join)         All rows from the left table given a condition (Left Join)         All rows from the right table given a condition (Fight Join)         All rows from both tables given a condition (Full Outer Join)         The cartesian product (Cross Join)         Condition         Left table and column:									_
Join type         Matching rows only given a condition (Inner Join)         All rows from the left table given a condition (Left Join)         All rows from the right tables given a condition (Right Join)         All rows from both tables given a condition (Full Outer Join)         All rows from both tables given a condition (Full Outer Join)         The cartesian product (Cross Join)         Condition         Left table and column:								Close	Help
Loin type         Matching rows only given a condition (Inner Join)         All rows from the left table given a condition (Left Join)         All rows from the right table given a condition (Right Join)         All rows from both tables given a condition (Full Outer Join)         All rows from both tables given a condition (Full Outer Join)         All rows from both tables given a condition (Full Outer Join)         The cartesian product (Cross Join)         Condition         Left table and column:									
Matching rows only given a condition (Inner Join)         All rows from the left table given a condition (Left Join)         All rows from the right table given a condition (Right Join)         All rows from both tables given a condition (Full Outer Join)         The cartesian product (Cross Join)         Condition         Left table and column:	n Prope	rties						×	
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All rows from the right table given a condition (Right Join) All rows from both tables given a condition (Full Outer Join) The cartesian product (Cross Join)	Įoin type		14					×	
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Condition	Įoin type Matching All rows fr	rows only give om the left tab	le given a co	ndition ( Left Jo				×	
Left table and column:	<u>l</u> oin type Matching All rows fr All rows fr All rows fr	rows only give rom the left tab rom the right ta rom both table:	le given a co ble given a c s given a cor	ndition ( Left Jo condition ( Right	Join)				
Left table and column:	<u>l</u> oin type Matching All rows fr All rows fr All rows fr	rows only give rom the left tab rom the right ta rom both table:	le given a co ble given a c s given a cor	ndition ( Left Jo condition ( Right	Join)				
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Filter to include in the 'join tables on' clause	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join) erJoin) ) Righttable	and columr	n:		
	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join) erJoin) ) Righttable	and columr	n:		
	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join) erJoin) ) Righttable	and column	N:		
	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join) erJoin) ) Righttable	and column	N:		
Cjear E <u>di</u> t	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join ) er Join ) Right table • [12.Type				
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	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right ndition (Full Out	:Join ) er Join ) Right table • [12.Type				
	Loin type Matching All rows fr All rows fr All rows fr The carte Conditic Left tabl	rows only give om the left tab om the right ta om both table sian product ( on e and column: Type	le given a co ble given a c s given a cor Cross Join )	Indition (Left Jo condition (Right indition (Full Out	:Join ) er Join ) Right table [12.Type	ſ	Edit		

Multiple Common Variables

If data sets have multiple variables in common:

An automatic join uses only one variable to match the data sets.

It may be necessary to manually join the tables using other variables the data sets have in common.

Joining by Multiple Variables (continued)

Right-click the next join variable from the first table.

Select Join <variable> with.

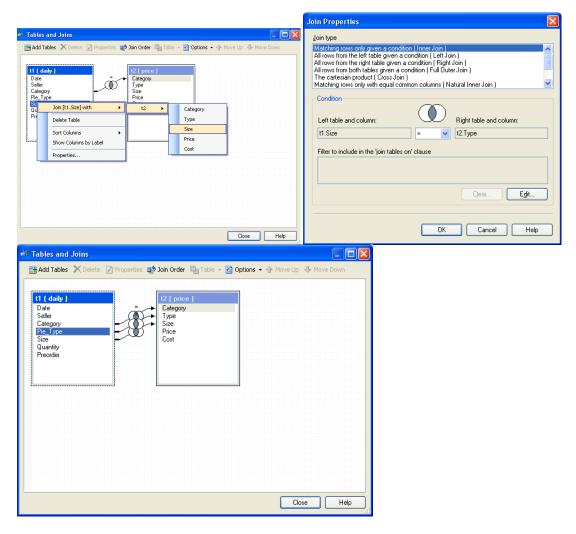
Select the name of the second table.

Select the name of the join variable from the second table.

Select the type of join from the pop-up menu.

Repeat for additional join variables.

Click Close.



### Removing a Join Variable

Right-click the join symbol connecting the variables.

Click Delete Join.

Click Yes. Click Close.

🕌 Tables and Joins		Į.			
🖽 Add Tables 🗙 Delete 📝 Properties 📑 Join Order	Table 👻 🔀 Options 👻	🏠 Move Up 🛛 🕀 Move Do	own		
t1 ( daily )       Date       Seller       Category       Pice       Size       Quantity       Preorder					
		Close	Help		
Kodd Tables and Joins     Add Tables ➤ Delete ☑ Properties ﷺ Join Orde					
11 ( daily )       Date       Seller       Category       Pie_Type       Size       Quantity       Preorder	y				
		Close	Help		
Tables and Joins					×
Are you sure you w	ant to permane	ntly remove	the join	from the que	γ?
	Yes	<u>N</u> o			

Joining More Than Two Tables

Continue adding data sets.

Modify joins or make manual joins as necessary.

Join up to 32 tables in a single query.

Tables a	and Joins							
🖁 Add Tab	bles 🗙 Delete	Properties	🔊 Join Ord	er 🏨 Tab	le 👻 🔀 Op	otions 👻 🛧	Move Up 🕀 Mo	ve Down
t1 ( dai Date Seller Category Pie_Typ Size Qua Preo	y				Cat Typ Size Cos	e	★ 13 (nutrition Type Calories_per_ Contains_nut Contains_dai	serving
Tables	and Joins						Close	Help
	and Joins ables X Delete	Properties	🔊 Join Ord	er 🏨 Tab	le + 😭 Op	otions 🕶 🛧		Help
	ables X Delete ily ) ry pe	Properties	Join Ord	ce )		itions ▼ ᠿ		Help Pown
<mark>t1 ( da</mark> Date Seller Catego Pie_Ty Size Quantit	ables X Delete ily ) ry pe	Properties	t2 ( pr Catego Type → Size Price	ce )		itions • 🛧	Move Up 🔸 Mor 13 ( nutrition Type Calories_per_i Contains_nuts	Help

Results (selected columns)

Click Run to run the query.

Date	Category	Pie_Type	Size	Quantity	Price	Cost	Calories per Serving
06/25/2006	Chocola <b>Colur</b>	nns from Daily	data	2	Colu		Columns
06/25/2006	Chocolate Pies	Death By Chocolate	8	1	froi Pric		from
06/25/2006	Chocolate Pies	Peanut Butter Cup	8	2	dat	-	Nutrition data
06/25/2006	Chocolate Pies	Peanut Butter Cup	10	1	11.99	б	750
06/25/2006	Chocolate Pies	Black Forest	8	5	7.99	3.95	700
06/25/2006	Fruit Pies	Raspberry	10	2	8.99	4.2	400
06/25/2006	Fruit Pies	Strawberry	10	2	6.99	3.7	485
06/25/2006	Fruit Pies	Blueberry	10	3	7.99	4	375
06/25/2006	Fruit Pies	Lemon Meringue	10	5	10.99	5.65	525
06/25/2006	Fruit Pies	Banana Cream	8	2	7.99	4.2	490
06/25/2006	Fruit Pies	Apple	8	4	6.99	3.7	350
06/25/2006	Fruit Pies	Apple	10	1	8.99	4.5	350

Modifying Joins

By default, all joins are inner joins.

To change the join type:

Click the Join Tables button in the Query Builder.

Right-click the join symbol (

**Click Properties.** 

Under Join type, select the new join type.

Click OK. Click CLOSE.

Tables and Joins				
🗄 Add Tables 🗙 Delete 📝 Properties	: 📫 Join Order	Table 👻 🔀 Options 👻	🛧 Move Up 😽 Mov	e Down
t1 ( daily ) Date Seller Category Pie Type Size Quantity Preorder	t3 ( nutrit Type Calories p Delete Join Properties			
			Close	Help
in Properties				
<u>Join type</u> Matching rows only given a conditio All rows from the left table given a co All rows from the right table given a o All rows from both tables given a co The cattesian product (Cross Join) Matching and a contract (Cross Join)	ondition ( Left Jo condition ( Right ndition ( Full Out	Join) erJoin)		
Matching rows only with equal comm	non columns ( IN	aturai Inner Join J		
Left table and column:		Right table and colum	m:	
t1.Pie_Type	= 🗸	t3.Type		
Filter to include in the 'join tables or	n' clause			
		Clear	E <u>d</u> it	

Calculating New Values-Replacement

Replacing values changes select values in a column based on a set of rules you create.

Both discrete values and ranges of values can be replaced.

Replacing Discrete Values

New Computed Column	×
<b>3</b> of 5 Specify a replacement	Sas
Replace       With         = Peanut Butter Cup       'Mint Chocolate Chip'         = Strawberry       'Peach'	Other values Replace all other values with: <ul> <li>The <u>c</u>urrent value</li> <li>A <u>m</u>issing value</li> <li>Specify a value:</li> <li>Enclose value in guotes</li> </ul>
<u>A</u> dd <u>E</u> dit <u>D</u> elete < <u>B</u> ack ▼ <u>N</u> ext>	C <u>h</u> aracter     Numeric

Replacing Discrete Values (continued)

The new column will appear on both the Tables list and the Select Data tab.

It can be manipulated in the same ways as other columns in the query.

Query Builder2 for S:\ssc\COURSES\C	ourse Files\Enterpri	se Guide 4\Data	a for Enterprise	e Guide Class\	Sample Data\	price.sas7bdat	×
Query name: Query Builder2		Output name:	SASUSER.Q	UERY_FOR_PF	RICE_SAS7BDA	T <u>C</u> h	ange
Computed Columns Prompt Manage			<u>n</u> s •				
Add Tables X Delete Join Tables	Select Data Filter Data	Identifier	Summary	Format  Format Format  Format	Details CASE WHEN	'Peanut Butter Cu	
	✓	ows only					
			<u>R</u> un	S <u>a</u> ve an	d Close	Cancel	Help

Results

Click Run to run the query.

Category	Туре	updated_types	Size	Price	Cost
Chocolate Pies	Chocolate Mousse	Chocolate Mousse	8	8.99	4.25
Chocolate Pies	Chocolate Mousse	Chocolate Mousse	10	10.99	5.5
Chocolate Pies	French Silk	French Silk	8	6.99	3.2
Chocolate Pies	French Silk	French Silk	10	8.99	4.75
Chocolate Pies	Death By Chocolate	Death By Chocolate	8	10.99	5.25
Chocolate Pies	Death By Chocolate	Death By Chocolate	10	12.99	6.85
Chocolate Pies	Peanut Butter Cup	Mint Chocolate Chip	8	9.99	5
Chocolate Pies	Peanut Butter Cup	Mint Chocolate Chip	10	11.99	6
Chocolate Pies	Black Forest	Black Forest	8	7.99	3.95
Chocolate Pies	Black Forest	Black Forest	10	9.99	4.95
Fruit Pies	Raspberry	Raspberry	8	6.99	3.55
Fruit Pies	Raspberry	Raspberry	10	8.99	4.2
Fruit Pies	Rhubarb	Rhubarb	8	5.99	3.15
Fruit Pies	Rhubarb	Rhubarb	10	7.99	3.85
Fruit Pies	Strawberry	Peach	8	4.99	2.6
Fruit Pies	Strawberry	Peach	10	6.99	3.7
Fruit Pies	Blueberry	Blueberry	8	5.99	3.2
Fruit Pies	Blueberry	Blueberry	10	7.99	4
Fruit Pies	Lemon Meringue	Lemon Meringue	8	8.99	4.55
Fruit Pies	Lemon Meringue	Lemon Meringue	10	10.99	5.65
Fruit Pies	Banana Cream	Banana Cream	8	7.99	4.2
Fruit Pies	Banana Cream	Banana Cream	10	9.99	5.1
Fruit Pies	Apple	Apple	8	6.99	3.7
Fruit Pies	Apple	Apple	10	8.99	4.5

Replacing a Range of Values

Specify a Replacem	ent		
Replace Values Re	place a Range	Replace Condition	
Set a lower limi	t		
Set an <u>u</u> pper lin	nit:		
With this value: 9.5 Enclose this value	e in guotes	OK	Cancel Help
New Computed Colum	in		
<b>3</b> of 5 Specifyε	a replacement		<u>s</u> .sas
Replacement			Other values
Replace 7.019	With 9.5		Replace all other values with:            • The current value             • A missing value             • Specify a value:             • Enclose value in guotes                         • Column type             • Character
A	<b>id</b> <u>E</u> dit	<u>D</u> elete	Numeric

# Results

The new column will appear both on the Tables list and the Select Data tab.

It can be manipulated in the same ways as other columns in the query.

Category	Туре	Updated_types	Size	Price	Co	New_Price
Chocolate Pies	Chocolate Mousse	Chocolate Mousse	8	8.99	4.2	9.5
Chocolate Pies	Chocolate Mousse	Chocolate Mousse	10	10.99	5	i 10.99
Chocolate Pies	French Silk	French Silk	8	6.99	3	6.99
Chocolate Pies	French Silk	French Silk	10	8.99	4.1	9.5
Chocolate Pies	Death By Chocolate	Death By Chocolate	8	10.99	5.2	10.99
Chocolate Pies	Death By Chocolate	Death By Chocolate	10	12.99	6.8	12.99
Chocolate Pies	Peanut Butter Cup	Mint Chocolate Chip	8	9.99		9.99
Chocolate Pies	Peanut Butter Cup	Mint Chocolate Chip	10	11.99		i 11.99
Chocolate Pies	Black Forest	Black Forest	8	7.99	3.9	9.5
Chocolate Pies	Black Forest	Black Forest	10	9.99	4.9	9.99
Fruit Pies	Raspberry	Raspberry	8	6.99	3.5	6.99
Fruit Pies	Raspberry	Raspberry	10	8.99	4	9.5
Fruit Pies	Rhubarb	Rhubarb	8	5.99	3.1	5.99
Fruit Pies	Rhubarb	Rhubarb	10	7.99	3.8	9.5
Fruit Pies	Strawberry	Peach	8	4.99	2	4.99
Fruit Pies	Strawberry	Peach	10	6.99	3	6.99
Fruit Pies	Blueberry	Blueberry	8	5.99	3	5.99
Fruit Pies	Blueberry	Blueberry	10	7.99		9.5
Fruit Pies	Lemon Meringue	Lemon Meringue	8	8.99	4.	9.5
Fruit Pies	Lemon Meringue	Lemon Meringue	10	10.99	5.6	10.99
Fruit Pies	Banana Cream	Banana Cream	8	7.99	4	9.5
Fruit Pies	Banana Cream	Banana Cream	10	9.99	5	9.99
Fruit Pies	Annia	Annia	8	6 99	3	6 99

Computed Columns

A computed column contains data calculated from values in other columns across each observation.

For example, a computed column may contain the sum of two variables.

Adding a New Computed Column

In the Query Builder, click the Computed Columns button to open the Computed Columns window.

Click the New button.

Select Advanced Expression. Click Next.

	for S:\ssc\COURSE	S\Course Files\Enterp	rise Guide 4\Data f	· · · ·	
	Computed Colum	ins			
Computed Colum	Column	Details			<u>N</u> ew
E Statego					<u>E</u> dit
- A Type - D Size - D Price					Delete
- O Cost					<u>R</u> ename
					Close
	Add new comput	ed columns to the query :	election		
		<		>	U III
		Select distinct rows	only		
		Bun	Save and Close	Cancel	Help

The Expression Builder

The Expression Builder can be used to create an expression for a new column of data using combinations of operators, variables, numbers and functions.

New Computed Column	×
<b>2</b> of 4 Build an advanced expression	<u>S</u> .sas.
Enter an expression:	
Home Next Back End Undo Redo Edit • Eavorites • Validate + - * / **    (x) 'x' "x" , 'abc'n	
Functions     Tables     Tables     Category     A Type     Size     Price     Sost     Selected Columns	
<u>≺B</u> ack ▼ <u>N</u> ext> <u>Finish</u>	Cancel Help

Building an Expression

Add elements to the expression box by:

Typing in the Expression Text Box.

Clicking operators on the Operator Bar.

Double-clicking variables on the Variable Values list on the Data tab.

Double-clicking functions on the Functions list on the Functions tab.

New Computed Column	X
<b>2</b> of 4 Build an advanced expression	<u>s</u> sas
Enter an expression:	
Home Next Back End Undo Redo Edit - Favorites - Validate	
+ - * / **    (x) 'x' "x" , 'abc'n	
Functions     Tables     Category     Size     O Price     O Cost     Selected Columns	
< <u>B</u> ack ▼ <u>N</u> ext> Einish Cancel	Help

Results

Click Run to run the query.

Category	Туре	Size	Price	C¢	st	Profit
Chocolate Pies	Chocolate Mousse	8	8.99	4	!5	4.74
Chocolate Pies	Chocolate Mousse	10	10.99		5	5.49
Chocolate Pies	French Silk	8	6.99		2	3.79
Chocolate Pies	French Silk	10	8.99	4	5	4.24
Chocolate Pies	Death By Chocolate	8	10.99	5	!5	5.74
Chocolate Pies	Death By Chocolate	10	12.99	6	15	6.14
Chocolate Pies	Peanut Butter Cup	8	9.99		5	4.99
Chocolate Pies	Peanut Butter Cup	10	11.99		6	5.99
Chocolate Pies	Black Forest	8	7.99	3	15	4.04
Chocolate Pies	Black Forest	10	9.99	4	15	5.04
Fruit Pies	Raspberry	8	6.99	3	6	3.44
Fruit Pies	Raspberry	10	8.99		2	4.79
Fruit Pies	Rhubarb	8	5.99	3	5	2.84
Fruit Pies	Rhubarb	10	7.99	3	15	4.14
Fruit Pies	Strawberry	8	4.99		6	2.39
Fruit Pies	Strawberry	10	6.99		7	3.29
Fruit Pies	Blueberry	8	5.99		2	2.79
Fruit Pies	Blueberry	10	7.99		4	3.99
Fruit Pies	Lemon Meringue	8	8.99	4	6	4.44
Fruit Pies	Lemon Meringue	10	10.99	5	6	5.34
Fruit Pies	Banana Cream	8	7.99		2	3.79
Fruit Pies	Banana Cream	10	9.99		1	4 89
Fruit Pies	Apple	8	6.99	3	3.7	3.29
Fruit Pies	Apple	10	8.99	4	1.5	4.49

# Shell Code

You can take the shell SQL code and modify with special options, etc.

😤 User Code	- O X					
Positions where user code may be inserted are indicated by the icons. Double-click on a marked line to add user code or change existing user code.						
/*						
Code generated by SAS Task						
Generated on: Friday, August 31, 2012 at 11:15:22 AM By task: List Data3						
Input Data: LE5274.NH00						
Server: SASApp						
•/	*					
<	4					
Clear <u>A</u> ll OK Cancel	Help					

The Swiss Army Knife of EG

EG's Query Builder can do so much of what we need in SAS. And it's easy!

**Recommended Reading** 

The Missing Semicolon: <u>http://www.sys-seminar.com/newsletter</u>

Monthly Enterprise Guide Tips

Chris Hemedinger-The SAS Dummy <a href="http://blogs.sas.com/content/sasdummy/">http://blogs.sas.com/content/sasdummy/</a>

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